

Original articles

Preschool vision screening: a service in need of rationalisation

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SUMMARY A survey of health districts in England and Wales was carried out at the end of 1984 to ascertain among other things the range of current programmes for preschool vision screening. The response rate was 81.3%. Altogether 94% of districts reported screening for both reduced visual acuity and squint; two districts screened for neither. A great variety of different types of tests were in use and screening was carried out at a variety of different ages. A high proportion of districts were screening children for reduced visual acuity in infancy, although screening tests applicable at this age have not been shown to be effective. Districts screened for squint between one and four times. Collection of routine monitoring information by districts was poor.

The term preschool vision screening is vague. It can be used to cover a great variety of activities from inspection of the visible structures of the eye and the alignment of the two visual axes to sophisticated tests of visual acuity and ocular muscle balance. It also covers systematic attempts to screen entire populations at specific ages with standardised instruments, and the application of one or more clinical tests of visual ability to children who present for developmental surveillance.

The term is most commonly applied to tests designed to identify ocular muscle imbalance (manifest or latent squint), the commonest of which is the cover test, or tests designed to identify reduced visual acuity. The latter can be caused by many different ophthalmological conditions, but in the preschool period it is most commonly due to amblyopia or refractive error.

The use of the term 'preschool vision screening' is also complicated by the fact that not all education authorities have the same policies on age at school entry. Children may start school at any age from 4 to 5½ years. Some parts of the country are well supplied with nursery school places and in these a high proportion of children may be in nursery school from the age of 3 years. Some districts regard the latter as preschool children, others as schoolchildren.

Attempts have been made to establish a national pattern for preschool vision screening with respect to the age at which children should have their vision tested. Both *Prevention in the Child Health Services*¹ and the 1980 *Health Visitors' Association Report*,²

recommended that all children should have their visual acuity tested and the cover test performed at 8 and 18 months of age and again at 2½ to 3 years and 4½ to 5 years. The Court Report³ recommended that 'tests of vision' be administered at 7 to 9 months and at 2 to 3 years. None of these reports have been specific about which tests should be used; indeed in the report of the Health Visitors' Association a comment was made to the effect that 'while preparing this paper the Association was acutely aware of the lack of systematic and scientifically based information concerning . . . the most valid and reliable tools for these procedures.'

The present study was carried out to document the current range of preschool vision screening practices. The method of investigation used, a questionnaire survey, has appreciable limitations in the study of an activity as diffuse as preschool vision screening. In particular it is difficult from a survey of this kind to identify districts with precisely comparable screening programmes. As a method of obtaining a broad picture of current programmes, however, and of identifying specific districts that are worthy of further study a questionnaire survey is the method of choice.

Methods

In November 1984 a detailed questionnaire was sent to the district medical officers of all health districts in England, Wales, and Scotland asking for information about their vision and hearing screening prog-

rammes for preschool and schoolchildren. Responses to questions on preschool vision screening from health districts in England and Wales are presented in this paper.

Altogether 165 districts returned a completed questionnaire: an overall response rate of 81.3%. One district refused to participate; and 37 failed to return their questionnaires after two reminders. There was no significant difference between response rates in different parts of the country; 11 out of a total of 15 geographical units (14 regional health authorities and Wales) had response rates of 80% or more. The four regions with low response rates were: Mersey (40%), North West and North East Thames (both 69%), and Trent (75%). The response rate to individual questions in the survey varied; non-respondents are therefore separately identified in each table.

Results

Altogether 155 (94%) districts screened for both reduced visual acuity and for squint; a further five (3%) screened for reduced visual acuity alone, and a further three (2%) for squint alone. Two health districts reported that they carried out no preschool vision screening. These districts were clear that they made no attempt to screen their entire population either for squint or for reduced visual acuity. In both these districts, however, children at high risk of visual problems and those whose parents were anxious about their visual ability or suspected a squint had their vision tested in child health clinics and both districts carried out screening among the 'at risk' 3 to 5 year olds in nursery school classes and day nurseries.

Table 1 shows the tests used in 160 districts

Table 1 Visual acuity tests used in preschool vision screening (n=160)

Type of test	Districts No (%)	Age range in months
Sheridan Gardiner letters	123 (76.9)	24-60
Stycar graded balls	88 (55.0)	0-48
Stycar picture matching	75 (46.8)	7-60
Hundreds and thousands	69 (43.1)	0-36
Catford drum	24 (15.0)	0-48
Matching E's	7 (4.4)	30-60
Kay pictures	6 (3.8)	Not stated
Stycar letters (five and seven letter tests)	5 (3.2)	Not stated
Beale Collins	5 (3.1)	8-60
Snellen	4 (2.5)	Not stated
Ffooks	2 (1.3)	36
Leeds picture test	1 (0.6)	Not stated
Stycar miniature toy test	1 (0.6)	Not stated

No visual acuity screening in five districts.

screening for reduced visual acuity. The Sheridan Gardiner letters test was the most common test and was used by 123 districts. Eighty eight districts used the Stycar graded balls test and 75 the Stycar picture matching tests. A total of 13 different types of test were in use. The range of ages at which these tests were used, where they were specified, was wide.

Districts were almost equally divided into those who aimed to screen children's visual acuity once, those who aimed to screen twice, and those who aimed to screen three or more times (table 2). Among those testing only once the age at testing varied from 8 to 52 months. The most common age for a single test was 36 months (19 districts). Among districts testing children's visual acuity twice the ages at testing were also very varied. The age at first test varied from 0-36 months, and at the second test, 10-60 months. Eight and 36 months was the most common combination but this was practised in only seven districts, and almost every combination of ages was represented.

Table 3 shows the tests used by the 158 districts who screened for squint. Altogether 145 districts used the cover test at some time in the preschool period. More than half of the districts used the corneal reflection test, and 69 said that they tested for squint by ocular movements. A number of

Table 2 Visual acuity screens (n=149)

No of screens	Districts No (%)
0	5 (3.4)
1	44 (29.5)
2	46 (30.8)
3	33 (22.1)
4	13 (8.7)
5	7 (4.7)
6	1 (0.7)

Age not specified in 16 districts.

Table 3 Screening tests for squints (n=158)

Type of test	Districts No (%)
Cover test	145 (91.8)
Corneal reflection	110 (69.6)
Ocular movements	69 (43.7)
20D Base out prism	18 (11.4)
Finger nose	17 (10.8)
TNO*	9 (5.7)
Convergence at near	5 (3.2)
Wirt*	4 (2.5)
Lang*	3 (1.9)
Keystone	3 (1.9)

No squint screen in seven districts.

*Tests of stereo acuity.

Table 4 *Cover test for squint (n=125)*

<i>No of screens</i>	<i>Districts No (%)</i>
0	13 (10.4)
1	50 (40.0)
2	24 (19.2)
3	37 (29.6)
4	1 (0.8)

Not specified in 33 districts; no squint screen in seven districts.

districts tested all children using more sophisticated orthoptic tests, the commonest of which was the 20D base out prism.

Some of the districts screening with the cover test used this on a number of occasions (table 4). Among districts in which the cover test was used only once the age at testing varied from 6 to 48 months.

Districts were asked for two simple measurements of their screening programmes; first, the proportion of children in their district screened for squint between 7 to 9 months in the previous year, and second the referral rate from this screening programme. Only 40 (25%) districts screening for squint could provide a figure for the proportion of children screened in the previous year; reported rates varied from more than 95% to 50%. An even smaller proportion (11%) of districts could record a referral rate for this programme; reported rates in the districts which could varied from 1% to 33%.

Discussion

Preschool vision screening is routine practice in almost all health districts and a very wide range of programmes exist. Without a 100% response rate the survey cannot provide a precise frequency distribution of districts using different programmes, but it does identify that at least two health districts are doing no vision screening; that at least 21 districts screen for reduced visual acuity on four or more occasions and that at least 38 districts carry out cover testing on three or more occasions.

The range of programmes documented in this survey is greater than that documented in the same survey for preschool and school hearing screening and for school vision screening.⁴ It cannot be compatible with a cost effective national service; some districts must inevitably be operating programmes that consume many extra resources for very little extra benefit.

The Stycar tests for detecting reduced visual acuity in infancy (0–2 years) were developed as clinical instruments for the assessment of vision in young and handicapped children and not as screening

instruments. One study has subsequently attempted to assess the value of these tests in a screening programme.⁵ The authors of this study found the tests to be ineffective and recommended that they should not be used for screening. Other experts have now lent support to this recommendation.⁶ Although discontinuing established practice takes time, one would hope that all the many districts currently using these tests have made plans to discontinue them in the near future.

Available evidence on the efficiency of tests used to screen for reduced visual acuity in the immediate preschool period (3–5 years) is only slightly more encouraging than that for the Stycar tests in infancy.^{5 7 8} All available tests give a positive result for an appreciable proportion of children with no abnormality, and miss an appreciable proportion of children with a problem. In well trained hands, however, it would appear that the tests can be used to achieve a reasonable level of efficiency.⁹ These programmes can also be criticised on the grounds that treatment for the conditions that are identified (amblyopia and refractive error) may not be very effective. Most trials of treatment for amblyopia including occlusion therapy and stimulation with gratings have been poorly controlled, and even these have shown only a modest improvement in vision.¹⁰ Although it is certain that some children treated in some centres do show an important visual improvement it would appear that most children detected in screening programmes benefit only modestly from treatment.¹¹ The treatment of refractive errors not associated with squint or amblyopia in the preschool period is based entirely on clinical evidence, because no studies have been conducted that show that this condition causes appreciable disability, nor that treatment can reduce it.¹² The combination of imperfect screening tests and relatively poor outcomes of treatment make it difficult to justify visual acuity screening at 3–5 years.

As for amblyopia screening, programmes for the identification of squint can be criticised both on the grounds of low efficacy of screening tests, false positive referrals from the cover test are very common, and on the grounds of low efficacy of treatment. Surgical treatment for this condition is reasonably effective for cosmetically disturbing squint, but this, by definition, does not need a screening programme for its identification. The effectiveness of orthoptic treatment for small angle and latent squints is much less certain, and has not been assessed in the context of the sound knowledge of the natural history of these conditions. For both visual acuity screening at 3–5 years and squint screening at all ages, the definitive studies that might determine exactly how much good they could

do to how many children have not been done. Until they are individual districts will have to decide whether they wish to continue running these screening programmes or whether their resources would be better deployed elsewhere.

Reading the scientific literature on preschool vision screening can only leave the reviewer with a feeling that discontinuing all these programmes would do children no harm; this evidence, however, needs to be balanced against the strongly held clinical view that this screening makes an important contribution to child health. In the midst of this dilemma, the two districts who do not screen would appear to offer an excellent opportunity to study 'a natural experiment.' If preschool vision screening programmes do make an important contribution to child health, then the visual health of children in these two districts should be demonstrably worse than that of children elsewhere.

The presentation of results from this survey has in the past invariably stimulated requests to make recommendations about what districts should do. Preschool vision screening has, however, suffered in the past like many of its counterparts in child health from too many recommendations made by too many people on the basis of too little evidence. This survey does not provide additional evidence as to what should and should not be done; it only identifies some significant anomalies in current practice. It is important to accept that we do not know what constitutes the optimum preschool vision programme at present, and that districts will need to make their own judgments as to what should or should not be done. At district level this decision can be based on a knowledge of what other services would need to be sacrificed in order to continue screening. All districts, however, owe it to the public whose time and money is spent on these programmes to provide a system for monitoring their effectiveness and efficiency. Such a system

would permit both the staff involved in screening and the general public to review annually the number of children whose health has improved as a result of screening, and the amount of work which has gone into achieving this improvement. These data would help districts considerably in making judgments as to what should and should not be done, but at present they are collected by only a small minority.

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